

Amendment B

Inventor(s) Name: Gu, et.al.

Attorney Docket No.: 1559 WO/US

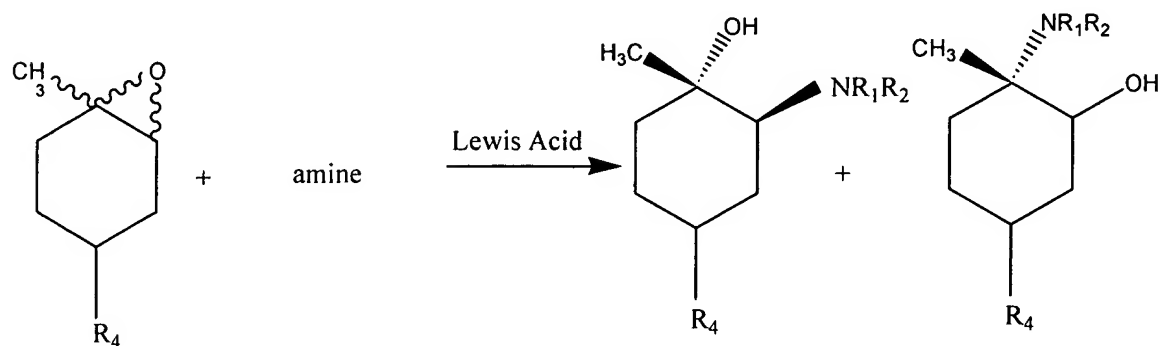
Amendments to the Claims:

1. (Original) A process for the regio- and stereoselective opening of an epoxide ring comprising:

reacting a compound having the epoxide ring with at least one amine in the presence of at least one Lewis acid.

2. (Previously presented) The process according to claim 1 wherein the at least one Lewis acid is selected from the group consisting of alkyl metal halides and metal halide ethers.

3. (Original) A process for preparing a (+)-p-mentha-2,8-diene-1-ol analog, the process comprising:



step a

Formula (1a)

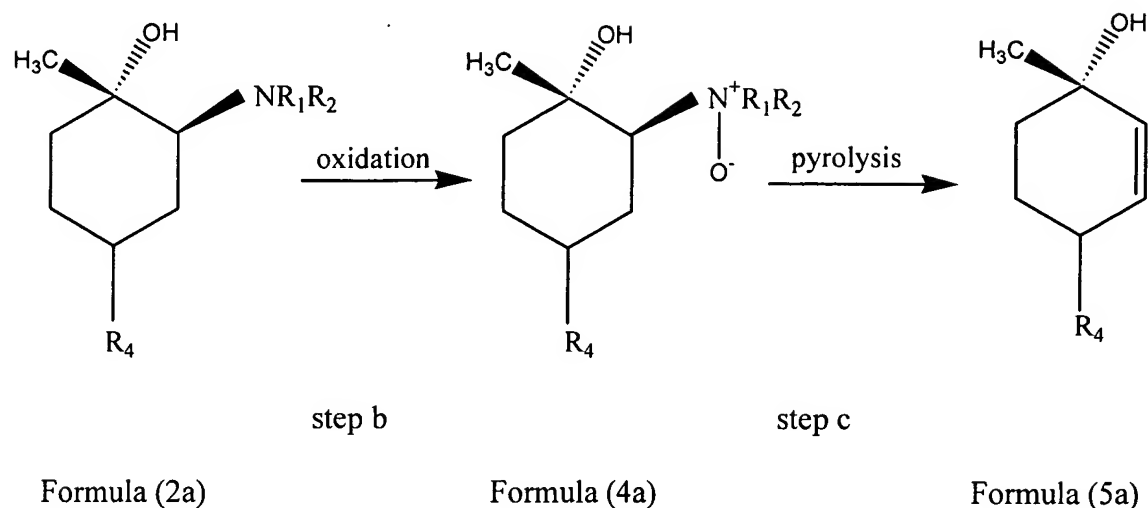
Formula (2a)

Formula (3a)

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wherein R₁ and R₂ are H, alkyl or aryl;
wherein R₄ is an alkyl, alkenyl or alcohol;
wherein step (a) comprises reacting a (+)-limonene oxide analog having the Formula (1a) with at least one amine of the formula R₁R₂R₃N in the presence of at least one Lewis acid to form amine adducts having the Formula (2a) and Formula (3a);

wherein step (b) comprises oxidizing the amine adduct of Formula (2a) to form an N-oxide having Formula (4a); and

wherein step (c) comprises pyrolyzing the N-oxide of Formula (4a) to form a (+)-p-mentha-2,8-diene-1-ol analog of Formula (5a).

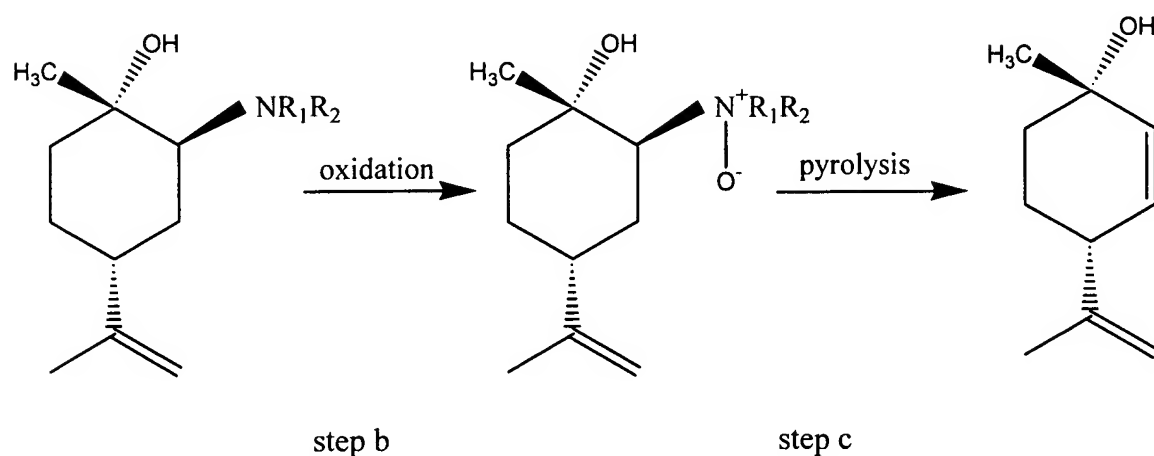
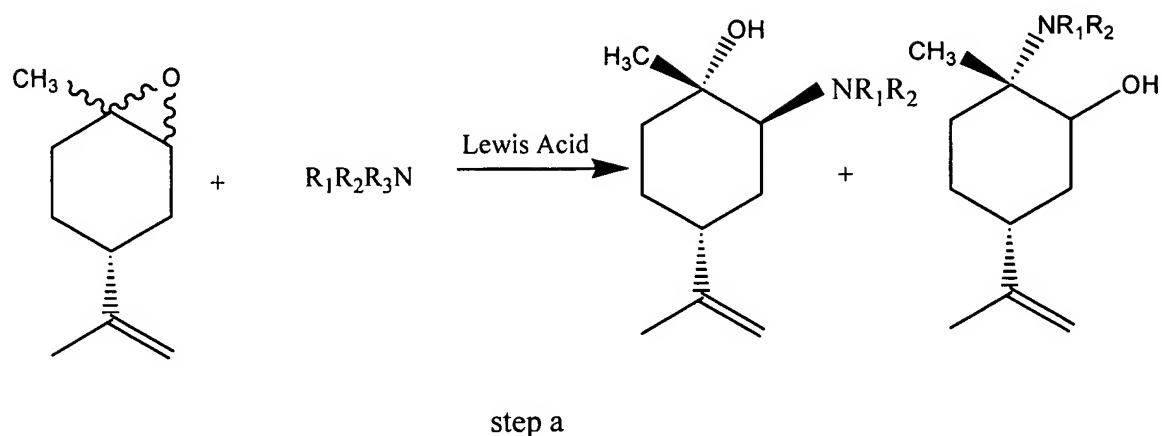
4. (Previously presented) The process according to claim 3 wherein the at least one Lewis acid is selected from the group consisting of alkyl metal halides and metal halide ethers.

5. (Original) A process for preparing (+)-p-mentha-2,8-diene-1-ol, the process comprising:

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Formula (2b)

Formula (4b)

Formula (5b)

wherein R_1 , R_2 and R_3 are H, alkyl or aryl groups;

wherein step (a) comprises reacting (+)-limonene oxide having the Formula (1b) with at least one amine of the formula $R_1R_2R_3N$ in the presence of at least one Lewis acid to form amine adducts having the Formula (2b) and Formula (3b);

wherein step (b) comprises oxidizing the amine adduct of Formula (2b) to form an N-oxide having Formula (4b); and

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wherein step (c) comprises pyrolyzing the N-oxide of Formula (4b) to form the (+)-p-mentha-2,8-diene-1-ol of Formula (5b).

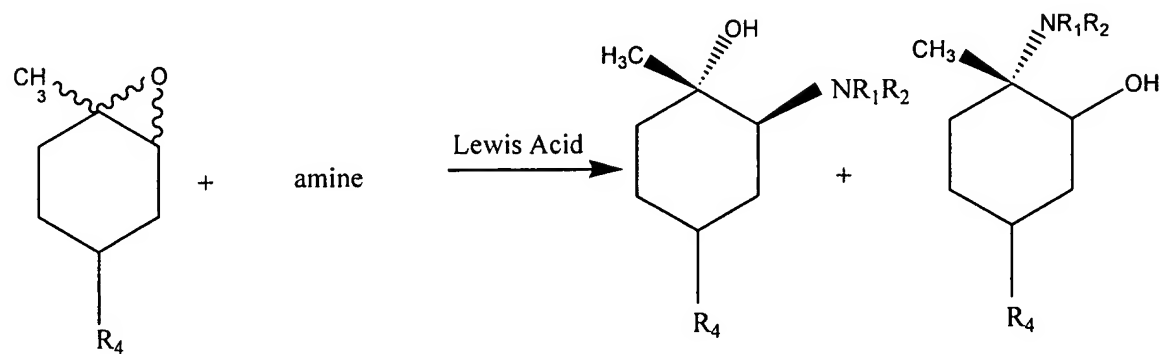
6. (Original) The process according to claim 5 wherein the at least one amine is selected from the group consisting of primary amines wherein R_1 is an alkyl or aryl group and R_2 and R_3 are H; secondary amines wherein R_1 and R_2 are alkyl or aryl groups and R_3 is H; and tertiary amines wherein R_1 , R_2 and R_3 are alkyl or aryl groups.
7. (Previously presented) The process according to claim 5 wherein the at least one Lewis acid is selected from the group consisting of alkyl metal halides and metal halide ethers.
8. (Cancelled)
9. (Original) The process according to claim 5 comprising oxidizing the amine adduct of Formula (2b) by reacting the amine adduct of Formula (2b) with at least one peracid to form the N-oxide of Formula (4b).
10. (Original) The process according to claim 5 comprising oxidizing the amine adduct of Formula (2b) by reacting the amine adduct of Formula (2b) with hydrogen peroxide in at least one alcohol to form the N-oxide of Formula (4b).
11. (Original) The process according to claim 5 comprising pyrolyzing the N-oxide of Formula (4b) in a solvent system including toluene in the presence of an at least one particulate matter selected from the group consisting of zeolites and silica gels.
12. (Original) The process according to claim 5 further including recovering the amine adduct of Formula (2b) by converting the amine adduct to an acid salt of the amine adduct of Formula (2b) by reaction with concentrated acid.

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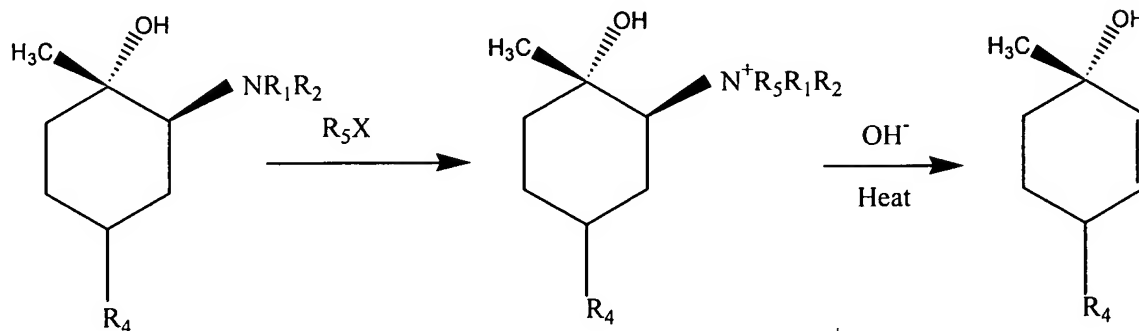
13. (Currently Amended) A process for preparing a (+)-p-mentha-2,8-diene-1-ol analog, the process comprising:



Formula (1a)

Formula (2a)

Formula (3a)



Formula (2a)

Formula (6a)

Formula (5a)

wherein R_1 , R_2 and R_3 are H, alkyl or aryl groups;

wherein R_4 is an alkyl, alkenyl or alcohol;

wherein R_5 is an H, alkyl or aryl;

wherein X is a halide;

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wherein step (a) comprises reacting a (+)-limonene oxide analog having the Formula (1a) with at least one amine of the formula $R_1R_2R_3N$ in the presence of at least one Lewis acid to form amine adducts having the Formula (2a) and Formula (3a);

wherein step (b) comprises converting the amine adduct of Formula (2a) to the acid salt of Formula (6a); and

wherein step (c) comprises base hydrolyzing Formula (6a) to form the (+)-p-mentha-2,8-diene-1-ol analog of Formula (5a).

14. (Original) The process according to claim 13 wherein the at least one amine is selected from the group consisting of primary amines wherein R_1 is an alkyl or aryl group and R_2 and R_3 are H; secondary amines wherein R_1 and R_2 are alkyl or aryl groups and R_3 is H; and tertiary amines wherein R_1 , R_2 and R_3 are alkyl or aryl groups.

15. (Previously presented) The process according to claim 13 wherein the at least one Lewis acid is selected from the group consisting of alkyl metal halides and metal halide ethers.

16. (Original) The process according to claim 13 wherein R_5X is methyl iodide.

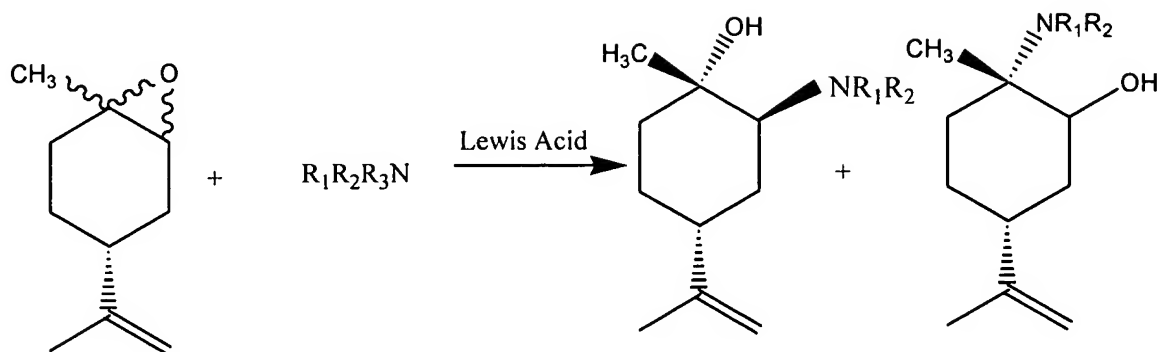
17. (Cancelled)

18. (Original) A process for preparing (+)-p-mentha-2,8-diene-1-ol, the process comprising:

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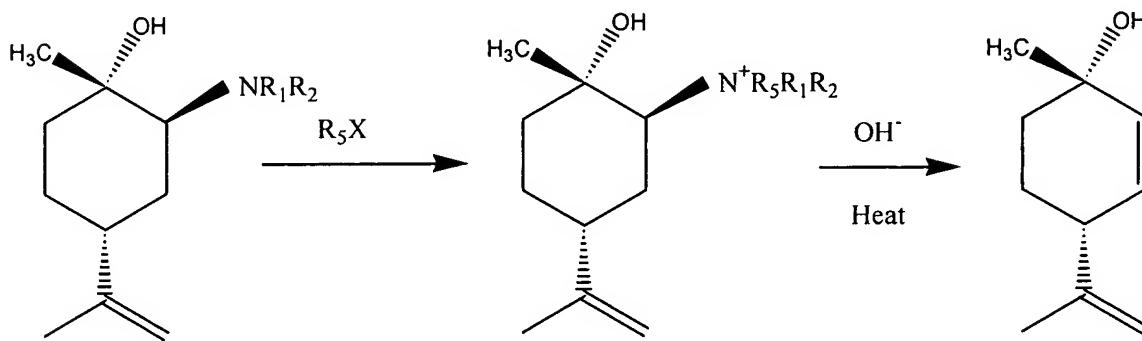


step a

Formula (1b)

Formula (2b)

Formula (3b)



step b

step c

Formula (2b)

Formula (6b)

Formula (5b)

wherein R_1 , R_2 and R_3 are H, alkyl or aryl groups;

wherein R_5 is an H, alkyl or aryl;

wherein X is a halide;

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wherein step (a) comprises reacting (+)-limonene oxide having the Formula (1b) with at least one amine of the formula $R_1R_2R_3N$ in the presence of at least one Lewis acid to form amine adducts having the Formula (2b) and Formula (3b);

wherein step (b) comprises converting the amine adduct of Formula (2b) to the acid salt of Formula (6b); and

wherein step (c) comprises base hydrolyzing Formula (6b) to form the (+)-p-mentha-2,8-diene-1-ol of Formula (5b).

19. (Original) The process according to claim 18 wherein the at least one amine is selected from the group consisting of primary amines wherein R_1 is an alkyl or aryl group and R_2 and R_3 are H; secondary amines wherein R_1 and R_2 are alkyl or aryl groups and R_3 is H; and tertiary amines wherein R_1 , R_2 and R_3 are alkyl or aryl groups.

20. (Previously presented) The process according to claim 18 wherein the at least one Lewis acid is selected from the group consisting of alkyl metal halides and metal halide ethers.

21. (Original) The process according to claim 18 wherein R_5X is MeI.

22. (Cancelled)

23. (Original) A method for the diastereomeric separation of a mixture of (+)-cis-limonene oxide and (+)-trans-limonene, the method comprising:

reacting the mixture with an amine in the presence of a Lewis acid; and

recovering the (+)-cis-limonene oxide that does not react with the amine.

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24. (Previously presented) The process according to Claim 1 wherein the Lewis acid is selected from the group consisting of lithium acetate, lithium bromide, lithium chloride, aluminum oxide and mixtures thereof.

25. (Previously presented) The process according to Claim 3 wherein the Lewis acid is selected from the group consisting of lithium acetate, lithium bromide, lithium chloride, aluminum oxide and mixtures thereof.

26. (Previously presented) The process according to Claim 5 wherein the Lewis acid is selected from the group consisting of lithium acetate, lithium bromide, lithium chloride, aluminum oxide and mixtures thereof.

27. (Previously presented) The process according to Claim 13 wherein the Lewis acid is selected from the group consisting of lithium acetate, lithium bromide, lithium chloride, aluminum oxide and mixtures thereof.

28. (Previously presented) The process according to Claim 18 wherein the Lewis acid is selected from the group consisting of lithium acetate, lithium bromide, lithium chloride, aluminum oxide and mixtures thereof.